FIELD LETTER: HGE1

TO: ALL REPRESENTATIVES

SUBJECT: Hydrogen gas evolution from motive power batteries

A major concern today is the volume of hydrogen gas given off while charging motive power batteries. This letter will explain how to calculate the volume of hydrogen evolved during a normal charge cycle.

Each ampere-hour of overcharge will dissociate 0.336 ml. of water to form 0.0161 cubic feet of hydrogen gas. This means that for every pint of water evaporated during the charge cycle there will be 23 cubic feet of hydrogen gas released to the atmosphere. Therefore by measuring the total volume of water required to refill all the cells within a battery to their correct level after each charge, it is a simple matter to calculate the total quantity of hydrogen gas evolved during the charge period.

Sample Calculation

Assume a certain large motive power battery requires a total of 1 1/2 pints of water to fill all cells to the proper level after each charge. How much hydrogen gas was evolved during the charge cycle?

Solution
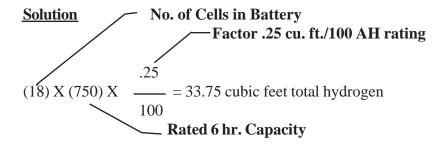
(1.5)(23) = 34.5 cubic feet total hydrogen

Please note that the gas will not evolved at a uniform rate throughout the charge period. Most of the gas will be evolved during that portion of the charge when the average cell potential exceeds 2.37 volts -- this is usually the last 2-3 hours.

When it is not possible to measure accurately the quantity of filling water, and when the battery in question will be charged by its companion sized battery charger, then the following approximation can be made.

A total of 0.25 cubic feet of hydrogen gas will be evolved from each cell during the charge cycle per 100 AH capacity.

Sample Calculation

Assume a 18-75-21 battery will be charged on a full 100% charger. What will be the total volume of hydrogen gas evolved during on overnight charge?

Solution   No. of Cells in Battery
                      Factor .25 cu. ft./100 AH rating

$$(18) \times (750) \times \frac{.25}{100} = 33.75 \text{ cubic feet total hydrogen}$$

                      Rated 6 hr. Capacity

Again, most of the gas will be evolved during the last few hours of charge.